

APPROVAL

AUTOMATED NETWORK PROFILE SWITCHER (ANPROS)

BY

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This thesis proposal was prepared under the direction of thesis advisor, Mr. Adzhar Bin Abd. Kadir, Department of Computer Technology and Networking, and it have been approved by thesis supervisor, Mr. Wan Ya Bin Wan Hussin. It was submitted to the Faculty of Information Technology and Quantitative Sciences and Quanttative Science and was accepted in partial fulfillment of the requirements for the degree of Bachelor of Science Honors Data Communication and Networking.

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DECLARATION

In the name of Allah, Most Gracious, Most Merciful. I, Mohd Zairulhisyam Bin Zakaria, declare that this thesis is my own work and to the best of my knowledge, it contains no material previously published, or substantially overlapping with material submitted for the award of any other degree at any institution, except where due acknowledgment is made in the text.

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ABSTRACT

Network profile contains the configuration setting of network such as IP addresses on local area network. Usually there will be more than one network profile stored in a notebook of mobile user such as home, office or campus networks. These network profiles apply different setting and configuration. In the campus area, the user will have to apply the campus network profile setting which then enable the users to utilize all network services provided by the network. Dealing with several network profiles make it difficult for the users to manually switch from one profile to another. The users have to reconfigure the IP, subnet mask and default gateway address before they are able to use the network. For average users, these tasks are quite difficult because they have to remember a lots of network information. The Automated Network Profile Switcher (ANProS) solves these problems by providing the user the capability to enable the operating system to automatically switch the network profile without user intervention and restarting the notebook. Therefore it can reduce the time for user to use the network and also provide a more convenient way to handles various network setting for mobile user. The ANProS works by scanning the available network and matched it to suitable existing network profile, thus make it an ideal tool for notebook users. The users only need to manually configure the setting if there is no suitable profile for the network, which means they are in the new local area network. Therefore, the ANProS will offer the mobile user a more comfortable way managing their network setting and providing such as a plug-in-and-play like environment especially to the mobile user.

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CHAPTER 1

INTRODUCTION

1.0 Introduction

Network is the most important things in today's computing infrastructure. Many companies require internet for advertising and getting information to sell their products. Educational institutions nowadays have their own network between branches and the internet. This has become common to the students and staff which deal with many assignment and information exchange.

1.1 Background

Assume that users have a DHCP-enable network at campus, and a static IP address assigned to your network card at home. Every time users connect the notebook to a new local network they have to change the network adapter setting manually. It will be easier if the user store two profiles called "campus" and "home" and switch between networks with these two profiles. But it would be a lot easier if the switching is done automatically by certain utility installed to the operating system. The users just have to attach the Ethernet cable and the utility will examine the appropriate profile to apply to the system.

ANSPoS has the ability to create a new network profile. For further flexibility, this utility provides ability for the users to manually customize the created network profile to suit advance user's need and requirement. Thus, if the users deal with two of more network locations, they can use ANProS utility to switch from one network profile to another network profile.

1.2 Problem Statement

Most of the people these days especially student uses notebook which is mobile and flexible compare to the desktop computer that is bigger and immobile. Therefore the notebook users deal with multiple network environments such as home local area network and campus network. Configuring new network setting for new network environment all the time might be a difficult task to some average user. Providing them with automated utility will reduce their burden in the configuration setting and ease their job to be in the desired network.

1.3 Objective

The first objective is to develop a prototype application that can provide a network profile creation capability and stored it. The second objective is to assure that the network profile created capable of providing a user a networking connectivity. The last objective is to provide the prototype application with the automated network profile switching capability.

1.4 Project Scope

This project will be developed on Windows platform and focusing on mobile user especially student in UiTM Shah Alam. This utility will also be developed using graphical user interface to create a friendly environment to the dedicated user.

1.5 Significance of the Research

The reason of the development of this utility is to provide a mobile user especially student to a convenient and flexible environment which dealing with the network

setting, configuring and profile switching. This automated utility reduce the time consume to enable user to be in their desired network. Thus enhance the conventional method in creating a new network profile.

CHAPTER 2

LITERATURE REVIEW

2.0 Introduction

The mobility terminology is getting very synonym to the current IT world. Mobility is movement that involves changing the position from oneself or an object for example small gadgets or devices. An example of the familiar device is notebook. Notebook is a portable computer that is useful to most of the people nowadays especially to whom travels a lot. Notebook provides similar capabilities as desktop computer for example word processing application, games, and most importantly networking. How can a mobile user adapt to changing places and different network environment? It can be accomplish by a certain application that is capable of creating a multiple network profile and stored it. This network profile can be applied later by the user when he is changing a network location regarding to the suitability of the profile created. The application will be more useful if it also provide the automated switching job between the existing network profiles. It will then provide flexibility and reduce the burden of the dedicated user to configure a network.

2.1 Definition of Terminology

2.1.1 Automated

Automated refer to the root word automatic which can be define as a something that operates by itself and a minimum user intervention in

computer terms for example a daemon service in the operating system such as updates status and antivirus software notification.

2.1.2 Network

Network can be defined as a group of devices such as computers and printers connected together or to hub or switch in order to share information and or tasks. Networks also include software and cables especially related to the communication itself. Information exchange and data sharing is very important nowadays especially to business and education. These networks allow everybody to get any information desired at anytime and any place for example through internet, local area network (LAN), and wide area network (WAN).

2.1.3 Network Profile

All of the accounts on Windows network for example are controlled by a master server or servers called a domain controller (DC). The DC stores each user's network profile, which consists of various files and setting network user account. A network profile contains the following setting such as network identification which is computer name and workgroup or domain name, TCP/IP information such as DHCP or static IP address, subnet mask, gateway, WINS, DNS, and proxy server used by Microsoft Internet Explorer. When applying a new profile, reboot is required if the profile contains different network identification setting such as computer name, workgroup or domain.

2.2 Definition of Technology Used

2.2.1 Network Basic Input/Output System (NetBIOS)

NetBIOS (Network Basic Input/Output System) was originally developed by IBM and Sytek as an Application Programming Interface (API) for client software to access LAN resources. Since its creation, NetBIOS has become the basis for many other networking applications. In its strictest sense, NetBIOS is an interface specification for accessing networking services.

NetBIOS, a layer of software developed to link a network operating system with specific hardware, was originally designed as the network controller for IBM's Network LAN. NetBIOS has now been extended to allow programs written using the NetBIOS interface to operate on the IBM token ring architecture. NetBIOS has since been adopted as an industry standard and now, it is common to refer to NetBIOS-compatible LANs.

It offers network applications a set of "hooks" to carry out inter-application communication and data transfer. In a basic sense, NetBIOS allows applications to talk to the network. Its intention is to isolate application programs from any type of hardware dependencies. It also spares software developers the task of developing network error recovery and low level message addressing or routing. The use of the NetBIOS interface does a lot of this work for them.

NetBIOS standardizes the interface between applications and a LANs operating capabilities. With this, it can be specified to which levels of the OSI model the application can write to, making the application transportable to other networks. In a NetBIOS LAN environment,

computers are known on the system by a name. Each computer on the network has a permanent name that is programmed in various different ways.

PC's on a NetBIOS LAN communicate either by establishing a session or by using NetBIOS datagram or broadcast methods. Sessions allow for a larger message to be sent and handle error detection and correction. The communication is on a one-to-one basis. Datagram and broadcast methods allow one computer to communicate with several other computers at the same time, but are limited in message size. There is no error detection or correction using these datagram or broadcast methods. However, datagram communication allows for communication without having to establish a session.

All communication in these environments is presented to NetBIOS in a format called Network Control Blocks (NCB). The allocation of these blocks in memory is dependant on the user program. These NCB's are divided into fields, these are reserved for input and output respectively.

NetBIOS is a very common protocol used in today environments. NetBIOS is supported on Ethernet, Token Ring, and IBM PC Networks. In its original induction, it was defined as only an interface between the application and the network adapter. Since then, transport-like-functions have been added to NetBIOS, making it more functional over time.

In NetBIOS, connection (TCP) oriented and connectionless (UDP) communication are both supported. It supports both broadcasts and multicasting and supports three distinct services: Naming, Session, and Datagram. (Neon Surge, 2007)

2.2.2 Domain Name Service (DNS)

On the Internet the DNS stores and associates many types of information with domain names; most importantly, it translates domain names or computer hostnames to IP addresses. It also lists mail exchange servers accepting e-mail for each domain. In providing a worldwide keyword based redirection service, DNS is an essential component of contemporary Internet use. (Foreman, 2007)

Pre-eminently, the DNS makes it possible to assign Internet destinations to the human organization or concern they represent, independently of the physical routing hierarchy represented by the numerical IP address. Because of this, hyperlinks and Internet contact information can remain the same, whatever the current IP routing arrangements may be, and can take a human-readable form (such as "wikipedia.org") which is rather easier to remember than an IP address (such as 66.230.200.100). People take advantage of this when they recite meaningful URLs and e-mail addresses without caring how the machine will actually locate them. (Chavez, 2007)

The DNS also distributes the responsibility for assigning domain names and mapping them to IP networks by allowing an authoritative server for each domain to keep track of its own changes, avoiding the need for a central registrar to be continually consulted and updated. (Chavez, 2007)

2.2.3 Wireless Networking

Wireless networking is a technology that range from global voice and data networks, which allow users to establish wireless connections across long distances, to infrared light and radio frequency technologies that are optimized for short-range wireless connections. Devices commonly used for wireless networking includes portable computers, desktop computers, hand-held computers, personal digital assistants (PDA's), cellular phones, pen-based computers and pagers.

Wireless technologies serve many practical purposes. For example, mobile users can use their cellular phone to access e-mail. Travelers with portable computers can connect to the Internet through base stations installed in airports, railway stations, and other public locations. At home, users can connect devices on their desktop to synchronize data and transfer files.

2.2.4 Transmission Control Protocol/ Internet Protocol (TCP/IP)

TCP and IP were developed by a Department of Defense (DoD) research project connect a number different networks designed by different vendors into a network of networks which is called Internet nowadays. It was initially successful because it delivered a few basic services that everyone needs for example file transfer, electronic mail, remote logon across a very large number of client and server systems. Several computers in a small department can use TCP/IP along with other protocols on a single LAN. The IP component provides routing from the department to the enterprise network, then to regional networks, and finally to the global Internet. On the battlefield a communications network will sustain damage, so the DOD designed TCP/IP to be robust and automatically recover from any node or phone line failure. This design allows the construction of very large networks with less central management. However, because of the

automatic recovery, network problems can go undiagnosed and uncorrected for long periods of time.

As with all other communications protocol, TCP/IP is composed of layers:

I. Internet Protocol (IP)

IP is responsible for moving packet of data from node to node. IP forwards each packet based on a four byte destination address (the IP number). The Internet authorities assign ranges of numbers to different organizations. The organizations assign groups of their numbers to departments. IP operates on gateway machines that move data from department to organization to region and then around the world.

II. Transmission Control Protocol (TCP)

TCP is responsible for verifying the correct delivery of data from client to server. Data can be lost in the intermediate network. TCP adds support to detect errors or lost data and to trigger retransmission until the data is correctly and completely received.

III. Sockets

Socket is a name given to the package of subroutines that provide access to TCP/IP on most systems. (Gilbert, 2007)

2.2.5 Dynamic Host Configuration Protocol (DHCP)

DHCP is a communications protocol that lets network administrators centrally manage and automate the assignment of IP addresses in an organization's network. Using the Internet Protocol, each machine that can connect to the Internet needs a unique IP address, which is assigned when an Internet connection is created for a specific computer. Without DHCP, the IP address must be entered manually at each computer in an

organization and a new IP address must be entered each time a computer moves to a new location on the network. DHCP lets a network administrator supervise and distribute IP addresses from a central point and automatically sends a new IP address when a computer is plugged into a different place in the network.

DHCP uses the concept of a "lease" or amount of time that a given IP address will be valid for a computer. The lease time can vary depending on how long a user is likely to require the Internet connection at a particular location. It's especially useful in education and other environments where users change frequently. Using very short leases, DHCP can dynamically reconfigure networks in which there are more computers than there are available IP addresses. The protocol also supports static addresses for computers that need a permanent IP address, such as Web servers.

DHCP is an extension of an earlier network IP management protocol, Bootstrap Protocol (BOOTP). DHCP is a more advanced protocol, but both configuration management protocols are commonly used and DHCP can handle BOOTP client requests. Some organizations use both protocols, but understanding how and when to use them in the same organization is important. Some operating systems, including Windows NT/2000, come with DHCP servers. A DHCP or BOOTP client is a program that is located in and perhaps downloaded to each computer so that it can be configured. (Biasci and Carrel, 2007)

2.2.6 Wireless Fidelity (Wi-Fi)

Wi-Fi is a brand originally licensed by the Wi-Fi Alliance to describe the underlying technology of wireless local area networks (WLAN) based on the IEEE 802.11 specifications. It was developed to be used for mobile

computing devices, such as laptops, in LANs (Local Area Networks), but is now increasingly used for more services, including Internet and VoIP (Voice over Internet Protocol) phone access, gaming, and basic connectivity of consumer electronics such as televisions and DVD players, or digital cameras. More standards are in development that will allow Wi-Fi to be used by cars in support of an intelligent transportation system to increase safety, gather statistics, and enable mobile commerce. Wi-Fi and the Wi-Fi CERTIFIED logo are registered trademarks of the Wi-Fi Alliance - the trade organization that tests and certifies equipment compliance with the 802.11x standards.

A person with a Wi-Fi enabled device such as a computer, cell phone or PDA can connect to the Internet when in proximity of an access point. The region covered by one or several access points is called a hotspot. Hotspots can range from a single room to many square miles of overlapping hotspots. Wi-Fi can also be used to create a mesh network. Both architectures are used in community networks.

Wi-Fi also allows connectivity in peer-to-peer or wireless ad-hoc network mode, which enables devices to connect directly with each other. This connectivity mode is useful in consumer electronics and gaming applications.

When the technology was first commercialized there were many problems because consumers could not be sure that products from different vendors would work together. The Wi-Fi Alliance began as a community to solve this issue so as to address the needs of the end user and allow the technology to mature. The Alliance created the branding Wi-Fi CERTIFIED to show consumers that products are interoperable with other products displaying the same branding.

2.3 Similar Project

2.3.1 LAN over IP (Project by Guillaume Bandet)

LAN over IP is using similar application which is C++ language but using a totally different method where the software is used to create a virtual LAN within Internet and does not provide network scanning capability.

2.3.2 Walter Wireless Networking Daemon (Project by John-Mark Patterson)

Walter Wireless Networking Daemon is using similar application which is C++ language and applied almost the same method which is scanning available network then configure but only works for wireless network.

2.3.3 Dyndaemon (Project by Martino Dell’Ambrogio)

Dyndaemon is using different application which is Perl language but it have almost the same method as ANProS but does not provide a GUI instead it uses command line interpreter.

2.3.4 IWGUI – Internet Wireless GUI (Project by Peter Dimopoulos)

IWGUI is using different application approach in the development which it Tcl programming language. The similarity in method is where the software scans the wireless network first and configures it later on. It does not cover on wired network.

2.3.5 Network Configuration Tool for Linux (Project by Vitja Makarov)

Network Configuration tool for Linux is using different application which is Python in the development. The different method is where user

manually do the switching job compared to ANProS. It also covers GPRS, Wireless, PPP and Ethernet.

2.3.6 KNetworkConf-KDE Network Configuration (Project by Juan Luis Baptiste)

KNetworkConf-KDE is using the same application which is C++ but build on POSIX platform and using different method in getting the network access. It is done manually using network manager.

2.3.7 Mobile NIC Switcher (Project by Florian Gerlach)

Mobile NIC Switcher is using different application which is C# programming language. The different in method is where user needs to manually switch the existing network profile configuration themselves.

2.3.8 Transparent Mobile IP (Project by Simon Chudley)

Transparent Mobile IP is using different application which are C++, Delphi/Kylix language and also different method where the client configuration remain the same while the networks itself change to suit the old configuration.

CHAPTER 3

RESEARCH APPROACH AND METHODOLOGY

3.0 Introduction

This chapter will provide an overview of the approach and methodology that will be used to develop the Automatic Network Profile Switcher application.

3.1 Approach

3.1.1 Theoretical Study

An observation method is used to gather information and to analyze how the application should be design. The information gathered includes sample source code of similar project and the coding references from the Internet. The other useful information includes related thesis reports from previous UiTM student. Those gathered information provide a better view on how to develop the prototype application.

3.1.2 Exploratory Study

The activities to locate a source of previous research collected data information.